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Coast to Cactus Weather Examiner

National Weather Service - San Diego

The National Weather Service Spotter Newsletter for Extreme Southwestern California

A New Real-time Reporting Network

We Want You

The NWS in San Diego is working on a bold new way of obtaining vital weather information that will increase the accuracy of our forecasts and warnings. There is a growing network of weather stations across our region that report hourly weather information directly to our office and augments the cooperative (coop) weather network already established.

How will it help us? Our mission is to protect lives and property from the adverse affects of weather. Our region is replete with unique climates and countless microclimates. Many weather phenomena are very small in scale, things like thunderstorms or strong winds, which can miss our equipment and our detection. Our dense population increases the impact whenever threatening weather occurs. With the new network, we will know better exactly what is going on, where, and when. With this added information, more accurate forecasts and warnings are on the way.

In This Issue

Among our nearly 1,000 weather spotters, we count 161 of you who have full weather stations installed on your property. Some of you have posted the weather data online. Others of you are part of the APRS/WXNET group of observers who have data posted on the wxqa.com web site. We hope to gain quick access to the data by typing a few keystrokes to find out weather conditions at a location. This would be easier and faster than attempting a phone call to a spotter when we need the data and taking the chance the spotter is available. Of course if more information is needed, a personal contact would be necessary.

Sometime in late August, look for a new web site on our home page **weather.gov/sandiego** for further information and to apply. The site will explain the vision of the project, the kind of commitment required, and it shows you how to be considered.

Season Precipitation Summary

The 2004-2005 precipitation season will go down as the wettest in the lifetimes of many. Precipitation totals ended up being 150% to 250% of normal across the region. Most areas fell between 200% and 210%. Here are some highlights:

The 2004-2005 season total precipitation was 22.49 inches, the third wettest season on record and 209% of normal. The wettest seasons on record (since 1850) are:

1883-84.....25.97
1940-41.....24.74
2004-05.....22.49
1977-78.....18.71
1921-22.....18.65

This is the first season since records began in 1850 that four inches or more of rain has fallen in four separate months in a single season. Previously, this record had been three months during the 1940-41 season. Four inches or more were recorded during the following months.

October.....4.98
December.....4.01
January.....4.49
February.....5.83

October 2004 ranks as the wettest October on record since 1850. The following are the wettest Octobers on record.

2004.....4.98
1925.....3.67
1941.....2.90
1889.....2.12
1883.....2.01

February 2005 ranks as the fifth wettest February on record since 1850. The following are the wettest Februarys on record.

1884.....9.05
1998.....7.65
1927.....6.68
1905.....5.90
2005.....5.83

Eight daily precipitation records were broken at Lindbergh Field.

		Old Record	
October 19	0.58	0.23	1949
October 20	0.95	0.59	1979
October 27	2.70	1.82	1883
December 28	1.27	1.01	1989
December 29	1.60	1.38	1879
January 3	1.08	0.62	1917
February 21	2.18	1.59	2000
March 4	1.12	0.80	1876

Monthly rainfall totals at Lindbergh Field.

	Total	Normal
July 2004	0.00	0.03
August	0.00	0.09
September	T	0.21
October	4.98	0.44
November	0.33	1.07
December	4.01	1.31
January 2005	4.49	2.28
February	5.83	2.04
March	2.12	2.26
April	0.59	0.75
May	0.12	0.20
June	0.02	0.09

Double the normal precipitation fell across the region.

	Total	Normal	% of Normal
Santa Ana	26.19	12.76	205
Laguna Beach	27.97	13.56	206
El Mirage	2.19	5.78	211
Big Bear Lake	44.01	21.15	208
Riverside	21.69	10.67	203
Palm Springs	12.85	5.23	246
Palomar Mountain	65.38	29.96	218
Oceanside Marina	21.80	11.13	196
San Diego	22.49	10.77	209
Borrego Desert	12.30	6.89	179

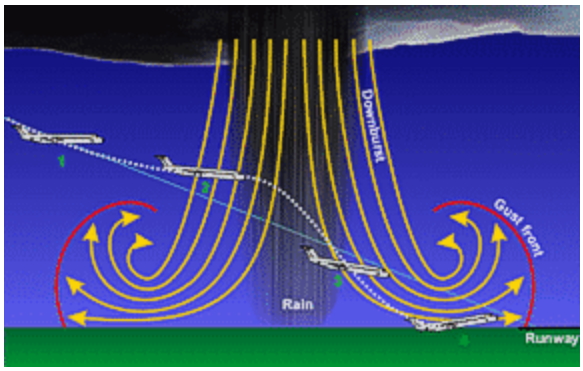
Some remarkable seasonal totals were reported from the area mountains. These are preliminary totals and may be incomplete or subject to error

Lytle Creek.....99.31
Lake Arrowhead.....86.89 (36.46 in Jan alone)
Palomar Mountain....65.38
Lake Cuyamaca.....54.24
Devore.....50.23
Big Bear Lake.....44.01

The Summer Monsoon

The Southwest Monsoon season occurs from July through September over the southwestern U.S., generally more prominent from Arizona eastward. Occasionally, episodes of monsoonal flow reach Southern California during late summer and bring thunderstorms (sometimes called "Sonoran" storms) mainly to the mountains and deserts.

The monsoonal flow develops as a strong upper ridge builds over the four corners region, which draws warm moist air from Mexico into the Southwest. Perturbations or disturbances in this flow such as an easterly wave trigger convection and thunderstorms. An easterly wave is an inverted low pressure trough within the monsoonal flow that moves from Arizona or Sonora westward into California. At times moist air flows northward from the Gulf of California further destabilizing the atmosphere. This is called a **gulf surge**. At times, even when the monsoon is absent, the moist air layer of the gulf surge is rather shallow and does not produce thunderstorms; it becomes a sort of hot, humid, desert marine layer. For thunderstorms to develop, the moist air moving into the region needs to be rather deep in the atmospheric column. The heating of the earth's surface further destabilizes the atmosphere and convection results; columns of locally heated bubbles of air rise in the moist atmosphere and grow into towering cumulonimbus clouds and thunderstorms. Sometimes the monsoonal flow spreads a shield of opaque cloudiness over the region. When this happens, convection may be inhibited because the sun is not able to effectively heat the earth's surface and sufficiently destabilize the atmosphere.



In the mountains and deserts, the air from the surface to the cloud level is usually very dry. As the thunderstorm produces rain, the drops fall into this drier layer and may completely evaporate (if falling rain does not reach the ground, it is called **virga**). This evaporation cools the column of air. Because cool air is heavier than warm air, the cool air in the warm environment will sink and accelerate as it descends. This **downburst** of air can reach the ground with damaging force. A highly localized downburst is called a **microburst**. Upon impact with the ground, the winds rapidly spread across the earth's surface as a **gust front**. Some gust fronts, or outflow boundaries, can converge with neighboring thunderstorm outflows. These colliding gust fronts, often called outflow boundaries, can create new lines of convection. Flash flooding in rough terrain can be very deceptive. A mountain thunderstorm can flood desert areas with water, mud and rock, even if no rain falls in the desert. Flash floods in areas of steep terrain, impenetrable rocky soil, and little vegetation are the most volatile.

Normally, monsoon thunderstorms are relatively rare west of the mountains, but can occur under the right conditions. If the winds from the mountain top level upward are rather strong from the east or southeast, thunderstorms can drift from the mountains to the valleys and even, in rare cases, to the coast.

San Bernardino Site Survey

From July 13-15th, staff members Jim Purpura (Meteorologist-in-Charge), Ed Clark (Warning Coordination Meteorologist), and Mark Moede (Lead Forecaster) did a site survey of the San Bernardino County Mountains and foothills. Over the past two years these areas were hard hit with catastrophic fires, torrential rains, flash flooding and mudslides. The threat for flash flooding will continue to be high in these denuded areas until the regrowth matures.

Because of this survey, we have gained a more profound understanding of our area and the threats of flash flooding and wildfires. This understanding will help us better prepare for these events and will result in more accurate and timely forecasts and warnings in the future.

Repaired section of Lytle Creek Road washed out by Lytle Creek this past winter. Lytle Creek is just a trickle in the summer.

City Creek as it flows through the town of Highland. Excavators are clearing the basin of the rocks and mud that came down the mountain. Note the narrow channel opening in the background, compared to the width of the debris flow.

Tsunami!

A 7.0 magnitude earthquake struck under the ocean floor 90 miles off the coast of Crescent City, California just before 8 pm on June 15th. The magnitude was such that the Alaska/West Coast Tsunami Warning Center (TWC) issued a Tsunami Warning for the entire West Coast. NWS offices along the coast each issued local Tsunami Warnings and activated the EAS. One hour later, the TWC canceled the warning because no significant increase in sea height was observed along the north coast, the closest land to the quake. This became a perfect test of warning systems and warning response for the NWS, Emergency Managers and other emergency personnel all along the coast. Many lessons were learned and updates to procedures have been made for all agencies concerned.

We encourage coastal communities to become "Tsunami Ready" to ensure that response to a warning is swift and efficient and so that ultimately the loss of life and property can be reduced. For more information about tsunamis and how to become Tsunami Ready, click on **tsunami.gov**.

Quarterly Summary

April

A passing trough brought some light rain to the region on the 8th and 9th. Most amounts were less than one tenth of an inch, however a few spots in the mountains reported up to one quarter of an inch. A cut-off low brought more substantial rain on the 23rd and 24th, with as much as three quarters of an inch reported in parts of Orange County, however most areas reported less than one half inch, and snow levels were above 7000 feet. The heaviest rain occurred with a squall line on the 28th, when amounts of one half, to one and one half inches were common, with local amounts over two inches on the coastal slopes. A funnel cloud was observed in Hemet as well.

San Diego - Lindbergh Field Data

	Max	Min	Avg	Rain
APR	67.9	55.7	61.8	0.59
Normal	68.7	56.4	62.6	0.75
Anomaly	-0.8	-0.7	-0.8	-0.16
% of normal				79%
Max	86	61		0.51
Min	59	52		

May

A large, late season storm over central California drove a strong upper-level jet over southern portions of the state late on the 5th. A few showers broke out early on the 5th, but the heaviest showers and thunderstorms developed late in the evening and continued until near dawn on the 6th. Widespread one half, to locally one and one half inch rains were reported across northern portions of the region, with amounts of less than one tenth, to nearly four tenths of an inch over southern sections including San Diego County. There were isolated reports of standing water two to three feet deep and stranded vehicles in Orange County and the Inland Empire.

San Diego - Lindbergh Field Data

	Max	Min	Avg	Rain
MAY	70.2	60.7	65.5	0.12
Normal	69.3	59.8	64.6	0.20
Anomaly	0.9	0.9	0.9	-0.08
% of normal				60%
Max	79	66		0.12
Min	64	56		

A number of daily temperature records were set in May, starting with 89 in El Cajon on the 14th and 105 for Thermal on the 15th. During the period from the 20th through the 24th there were almost two dozen

records set in Southern California. Notable from the list was Borrego Desert Park with a records of 110 and 112 on the 21st and 22nd.

June

No significant precipitation was observed this month. For the season, most areas recorded between 150% and 250% of normal. Despite the very wet season, no seasonal rainfall records were eclipsed at stations with records longer than 75 years. For Lindbergh Field in San Diego, it was the third wettest season on record (since 1850). And for Riverside UCR, it also was the third wettest since 1924, with several other years not far behind. Remote gages on the wettest slopes of the San Bernardino Mountains recorded close to 100 inches of precipitation for the season. With very few long term records available in these areas, it is possible that it may have been their wettest, or second wettest season on record.

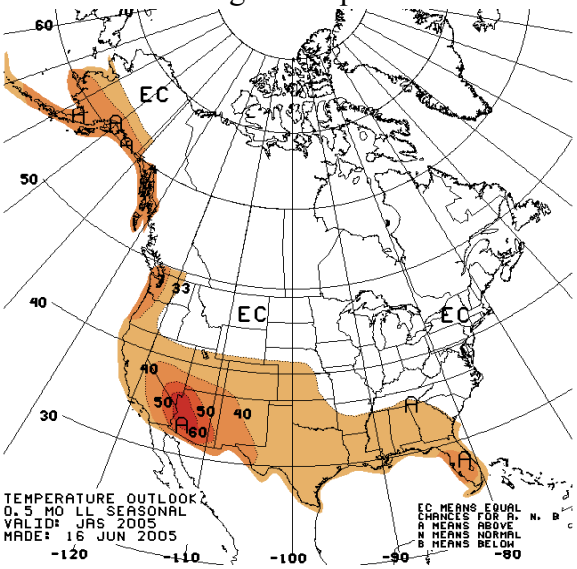
San Diego – Lindbergh Field Data

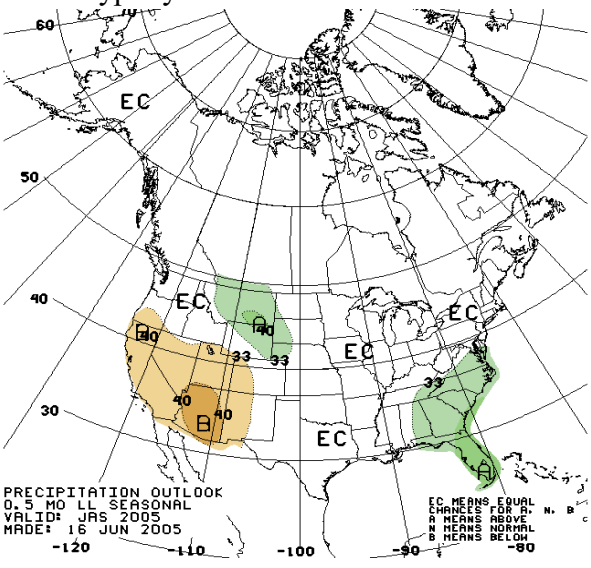
	Max	Min	Avg	Rain
JUN	70.2	62.4	66.3	0.02
Normal	72.2	62.6	67.4	0.09
Anomaly	2.0	0.2	1.1	-0.07
% of normal				22%
Max	76	64		1.12
Min	66	60		

Summer Outlook

Temperature and Precipitation

During the months of July through September, the Climate Prediction Center (CPC) predicts below normal precipitation for the desert southwest, but above normal temperatures. Southern California lies comfortably within these warmer and drier zones. This means the monsoon season of late summer is forecast to be below average in terms of moisture and thunderstorms. The skill in forecasting a summer monsoon season is lower than for winter precipitation associated with jet streams and storm tracks because there is often no recognizable pattern associated with monsoon type systems.





Hurricanes

The hurricane season for the eastern North Pacific region is forecast to be slightly below average by the CPC. The official outlook calls for 11-15 tropical storms (average is 15-16), with six to eight becoming hurricanes (average is 9) of which two to four (average is four to five) may become major hurricanes. As of July 10th, Dora, the fourth tropical storm of the season, had died harmlessly off the west coast of Mexico, while powerful Dennis was plowing into the Gulf Coast of Florida and Alabama. For more information click: **www.noaanews.noaa.gov/stories2005/s2438.htm**.

Fire

The fire outlook agrees with the warmer and drier general outlook. Thunderstorm potential associated with the monsoon is expected to remain farther east most of the time. Only a few lightning episodes (defined as three to five days in length) are expected during the late summer. The increased volume and continuity of grasses and fine fuels, especially in the desert, valley, and foothill areas, will add significantly to the fire potential. At of the end of June, curing was complete of the fine fuels, providing dry fine fuels capable of igniting and spreading fire quickly. Offsetting this danger somewhat is the higher live fuel moisture in the larger plant communities. For more information and graphics click: **www.noaanews.noaa.gov/stories2005/s2465.htm**.

Spotter News

On June 17th, spotter training took place in Barstow. Don Maker, the Spotter Program Manager from the NWS in Las Vegas gave the training to about 20 individuals. Ed Clark and Miguel Miller of the NWS in San Diego also were there. Lee Thomas, Southwest California Skywarn director was also there. Relationships were established and ideas flowed. On November 16, 2004, the boundary of forecast and warning areas between the two offices changed. This was a chance to make it clear to spotters in the Barstow vicinity where the new boundary lies. The Las Vegas office picked up the communities of Landers, Yucca Valley and Morongo Valley, so that all communities of the Morongo Basin would be serviced by one forecast office. In return, the San Diego office picked up land north of Victorville, including the community of Helendale – Silver Lakes.

Spotter talks are planned in Huntington Beach on September 14th (not open to the public), and in Encinitas, planned for some time in October. Keep an eye on our web page for the latest information.

If you haven't done it yet, please review the **Weather Guide** online. It will give you a better understanding of the function of the NWS in our region, a climate overview and weather history. You can view and print at **www.wrh.noaa.gov/sgx/research/Guide/weather_guide.php?wfo=sgx.**

More new spotters keep pouring in! We are now 979 and counting. If you have updates to your spotter information, like a change of address or phone numbers, new equipment, ham radio operation status, etc., please email me: miguel.miller@noaa.gov.

Miguel Miller, Editor
National Weather Service
11440 West Bernardo Ct., Ste. 230
San Diego, California 92127
Spotter calls: (800) 240-3022
General calls: (858) 675-8700
FAX: (858) 675-8712
Spotter e-mail: miguel.miller@noaa.gov
Skywarn e-mail: SDSkywarn@qsl.net

NWS San Diego Weather Spotter web site: weather.gov/sandiego/spotter/spotter.php?wfo=sgx
Coast to Cactus can always be found by clicking on spotter and skywarn information.
The *Weather Guide* online: www.wrh.noaa.gov/sgx/research/Guide/weather_guide.php?wfo=sgx

Southwest California Skywarn web site: www.swskywarn.org

Contributors to this issue:
Joe Dandrea, Mark Moede, Lee Thomas, Jan Null, NOAA